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| Cestodes | *Diphyllobothrium latum* | *Dipylidium caninum* | *T saginata* | Adult *T solium* | Egg/larvae *T solium* | *Echinococcus granulosus* |
| English name | Fish tapeworm |  | Beef tapeworm | Pork tapeworm | Cysticercosis |  |
| Mode of transmission to human and infective form | Eating improperly cooked fish/crustaceans containing larvae | Ingesting fleas infected with larvae | Ingesting larval form in undercooked beef | Ingesting larval form in undercooked pork | Ingesting egg ONLY from human feces | Ingesting eggs ONLY from (canid) dog feces |
| Migration within human | Larvae grow to mature tapeworm in small intestine in 3 mo. Can be 10 meters | Grows in small intestine | Grows in small intestine | Grows in small intestine | Penetrates GI🡪any organ | Penetrates GI🡪hydatid cyst in lungs, liver, etc. |
| Production of pathology | -megaloblastic anemia, caused by ↓ B12 | -abdominal discomfort, pruritic and diarrhea | -appendicitis or cholangitis (from passage of eggs through GI) | -appendicitis or cholangitis (from passage of eggs through GI) | cystercosis🡪skin, skeletal muscle, brain (10% of ER seizures) | -hepatic/pulmonary involvement  -rupture of cyst🡪 uticaria, eosinophilia |
| Diagnosis | Eggs/proglottids  (operculated with knob at bottom) | Eggs/proglottids in feces  (colorless egg packets) | Eggs or “gravid” proglottids in feces | Eggs or “gravid” proglottids in feces | Ab detection, IgE, eosinophilia | Ab detection, ultrasonography to look for hydatid cyst |
| Definitive host | Humans, carnivores | Humans, dog | Humans | Humans | Humans | Dogs |
| Intermediate host | Water flea and fish | Fleas | Ox, cattle | Humans & pigs | Humans & pigs | Humans and livestock |
| Form transmitted from human | Fecal eggs | Fecal eggs | Fecal eggs | Fecal eggs |  |  |
| Geographic foci | Worldwide | worldwide | worldwide | worldwide | worldwide | Most frequent in sheep raising countries |
| Treatment | prazyquantel | prazyquantel | prazyquantel | prazyquantel | Surgery to remove cysterci, anti-seizure medications | Surgery to remove cyst, danger if cyst ruptures🡪IgE/eosinophilia |

**Cestodes (tapeworms/segmented)** Helminthes- Hooman Golfeiz

**Trematodes (flukes/nonsegmented)**

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| Trematodes | *S.mansoni &*  *S.japonicum* | *S. haematobium* | *Paragonimus westermani* | *Faciola hepatica* | *Cercarial dermatitis* |
| English name |  |  | Lung fluke | Liver fluke | Wander Schistosoma |
| Mode of transmission to human and infective form | By contact through the skin by cercariae  (from fresh water) | By contact through the skin by cercariae  (from fresh water) | Ingestion of raw crustaceans containing metacercariae | Ingestion of metacercariae on water plants | By contact with cercariae |
| Migration within human | Penetrate skin (via HLA)🡪lose tail to form schistosomulae🡪get in blood🡪lay eggs in liver🡪intestinal lumen/bladder | Penetrate skin (via HLA)🡪 lose tail to form schistosomulae🡪get in blood 🡪lay eggs in liver🡪intestinal lumen/bladder | Penetrate intestinal wall🡪migrate to lungs and lay eggs🡪sputum🡪can be swallowed & enter feces | Penetrate wall🡪adults in hepatic biliary ducts | Penetrate skin🡪fail to form functional schistosomulum and die |
| Production of pathology | -pathology caused by inflammatory response to dead eggs  -portal hypertension, ascites, esophageal varices, liver fibrosis | Hematuria in early disease, fibrosis of bladder and obstructive uropathy, renal failure, hydronephrosis | -acute (invasion and migration): diarrhea, cough, IgE, eosinophilia  -chronic (Pulmonary): discoloration of sputum from eggs | -acute: diarrhea, enalrged liver  -chronic: intermittent block of biliary duct | Inflammatory reaction in skin (small red spots) |
| Diagnosis | Eggs in feces | Eggs in urine | -Eggs in stool/sputum  -Immunodiagnosis possible DD from TB | Eggs in stool |  |
| Definitive host | Humans | Humans | Humans | Humans, sheep, cattle | Birds |
| Intermediate host | Snails | Snails | Snails | Snails |  |
| Form transmitted from human | Eggs  (eggs produce proteases allowing tissue migration) | Eggs (50% of eggs die within host tissue causing most of the pathology) | Eggs | Eggs |  |
| Geographic foci |  |  | Southeast Asia and Japan | Sheep, cattle, consumption of raw watercress | Pond swimmers |
| Treatment | prazyquantel | prazyquantel | prazyquantel | Triclabendazole | Anti-inflammatory drugs |

**Nematodes (roundworms/nonsegmented)**

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| Nematodes | *Enterovious Vermicularis* | *Trichuris trichiura* | *Ascaris lumbricoides* | *Trichinella spiralis* | *Dracunculus medinensis* | *Necator/ancylostoma* |
| English name | Pinworm | Whipworm | Largest worm | Trichinosis | Guinea worm | Hookworm |
| Mode of transmission to human and infective form | Ingestion of embryonated eggs  (eggs take ~6 hrs to become mature) | Ingestion of embryonated eggs  (eggs take 3-4 days to become mature) | Ingestion of embryonated eggs  (eggs take 2-4 wks to become mature) | Ingestion of larvae in pork meat | Ingestion of unfiltered water containing L3 larvae | Flariform larvae penetrate skin |
| Migration within human | Intestine🡪migrate to perianal regions to lay eggs | Intestine🡪stay in cecum and lay eggs there | Intestine🡪lung/liver🡪  trachea🡪epiglottis🡪  swallowed🡪intestine | -small intestine🡪 mucosa🡪striated muscle (tissue) | -penetrate GI🡪fertilized female migrates to surface of skin🡪blister and discharges larvae | -skin🡪migrate via lung 🡪epiglottis🡪swallowed  ~Ascaris & westermani |
| Production of pathology | -often asymptomatic, perianal pruritis specially at night | - often asymptomatic, anemia, bloody diarrhea, mucous with heavy infections | -large numbers can cause pneumonitis and liver enlargement  -IgE, eosinophilia | -predilection for striated muscle, myocarditis potentially fatal, eosinophilia | -cutaneous-ground itch  -pulmonary phase- local hemorrhage, eosinophilia  -intestinal phase-iron deficiency, anemia, pica |
| Diagnosis | -Eggs (purple) on anal skin (scotch-tape test)  -Sometimes also in feces | -presence of eggs (football) in feces, NOT in perianal region | -eggs in feces (thick shell with mammillated layer)  -occasionally whole worms expelled | -based on clinical Sx (myositis) and IgE, eosinophilia  -EIA, biopsy | -painful blister, with worm emerging as a whitish filament | -Eggs (ovoid with transparent shell) in stool  -eosinophilia in migratory phase |
| Definitive host |  |  |  | -Humans, pork, mice |  |  |
| Intermediate host | Direct life cycle | Direct life cycle | Direct life cycle |  |  |  |
| Form from human | Eggs | Eggs | Eggs, Largest nematode |  | Larvae from blister | Eggs |
| Geographic foci | The most common helminthic infection in the U.S.  -temperate climate | -tropical climate, southern U.S. | Most common helminthic infection worldwide  -tropical climate | Home-raised pork, wild boar, polar bear, fox | Narrow belt of African countries | Moist climates |
| Treatment | Pyrantel pamoate, Mebendazole, Albendazole | Mebendazole | -No drug once migrated, Mebendazole | Steroids, Mebendazole, Albendazole | Mechanically extract of worm | Albendazole, Mebendazole, Pyrantel pamoate |

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| Nematodes | *Strongyloides stercoralis* | *Wuchereria bancrofti* | *Onchocerca volvulus* | *Anisakiasis* | *Toxocara cani/cati* | *A. braziliense/A. caninum* |
| English name | Threadworm | Elephantiasis | River blindness | Wander worm | Wander worm | Wander hookworm |
| Mode of transmission to human and infective form | Flariform larvae penetrate skin | Transmission of larvae by *mosquito* bite | Transmission of larvae by *blackfly* bite | Ingestion of infection fish with larvae | By ingestion of larvae | By contact (dog/cat) |
| Migration within human | - skin🡪migrate via lung 🡪epiglottis🡪swallowed  -similar to hookworm except: eggs hatch in intestine before they are passed to feces, larvae can mature into flariforms in intestine🡪autoinfection | Bite🡪lymph🡪  Produce microfilariae🡪blood and lymph | Bite🡪subQ nodules🡪  Produce microfilariae🡪skin and lymphs | Larvae penetrates gastric and intestinal mucosa | Tissue infection |  |
| Production of pathology | Hydrocele🡪chyluria  Elephantiasis, tropical pulmonary eosinophilia | Punctuate keratitis, blindness, subQ nodules, | Abdominal pain, severe eosinophilia  Resembles Crohn’s disease | -Visceral larva migrans (fever, wheezing, hepatomegaly eosinophilia) | -cutaneous larva migrans ( intensely pruritic) |
| Diagnosis | Rhabtidiform larvae in feces (NO eggs) | Microfilariae in peripheral blood by Kit, marked eosinophilia in CBC | -Microfilariae in skin snip biopsy, Ag/Ab  -DEC patch test-Mazzotti rxn | Gastroscopic examination and biopsy | asymptomatic  -Eosinophilia and + serology |  |
| Definitive host | Monkeys, dogs |  |  |  |  |  |
| Intermediate host |  |  |  |  |  |  |
| Form transmitted from human | Rhabtidiform larvae in feces |  |  |  |  |  |
| Geographic foci | Tropical, southern U.S. |  |  |  |  |  |
| Treatment | Ivermectin | Ivermectin, doxycycline, surgery of hydrocele, elephantiasis | Ivermectin, nodulectomy | Surgical removal | Albendazole | Self-limiting |